Using the Diagnostic ACE™

Reelmaster® 5100-D/5300-D

TORO®

Commercial Products

Part No. 92800SL, Rev. B

If the machine malfunctions, check the green Controller Diagnostic Lamp. If the lamp is *ON*, with ignition key switch in ON position, the electronic control unit (ECU) is functioning normally. If the lamp is blinking, the controller has detected a problem in the electrical circuit. The lamp will stop blinking and automatically reset when the key switch is turned OFF.

If Controller Diagnostic Lamp is *BLINKING ON* and *OFF* :

1. ECU has detected an output with a short circuit.
2. ECU has detected an output with an open circuit.

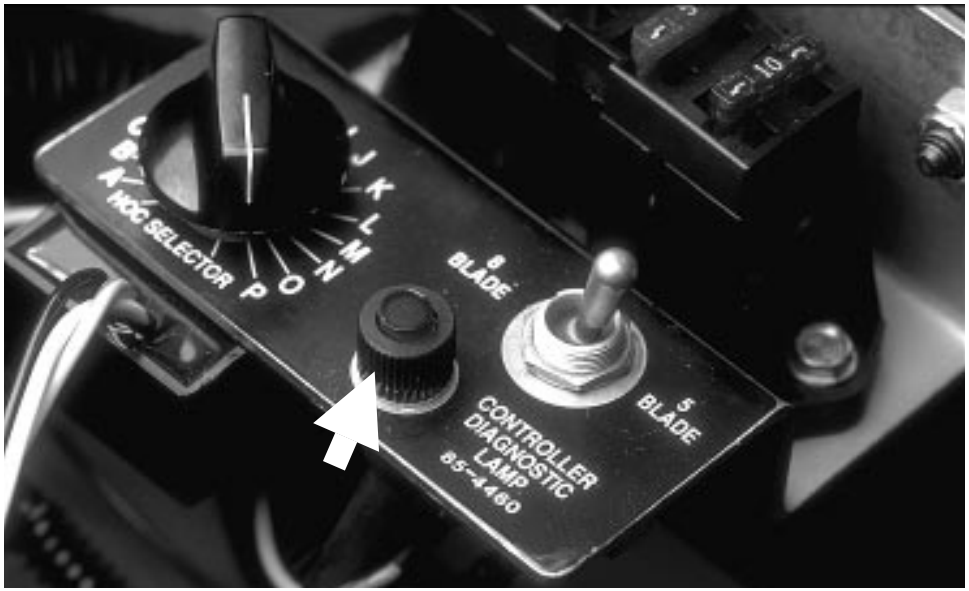
Use Diagnostic ACE™ to find which output is malfunctioning.

NOTE: If the green Controller Diagnostic Lamp is blinking on and off, connect the Diagnostic ACE, without turning the key switch off, then toggle to "OUTPUTS DISPLAYED". The blinking LED on the Diagnostic ACE will indicate which output is faulty. To stop the engine without turning off the key switch, use the manual fuel stop lever on the injection pump or grasp the steering wheel, raise yourself up off the seat and lightly push the traction pedal so the interlock circuit stops the engine.

If the controller diagnostic lamp is *OFF* :

1. ECU is not powered on.
2. Loop-back connector is not attached.
3. Diagnostic lamp is burned out.
4. ECU is not functioning correctly.

Check electrical connections, input fuses and diagnostic lamp to find malfunction. Make sure loop-back connector is secured to wire harness connector.



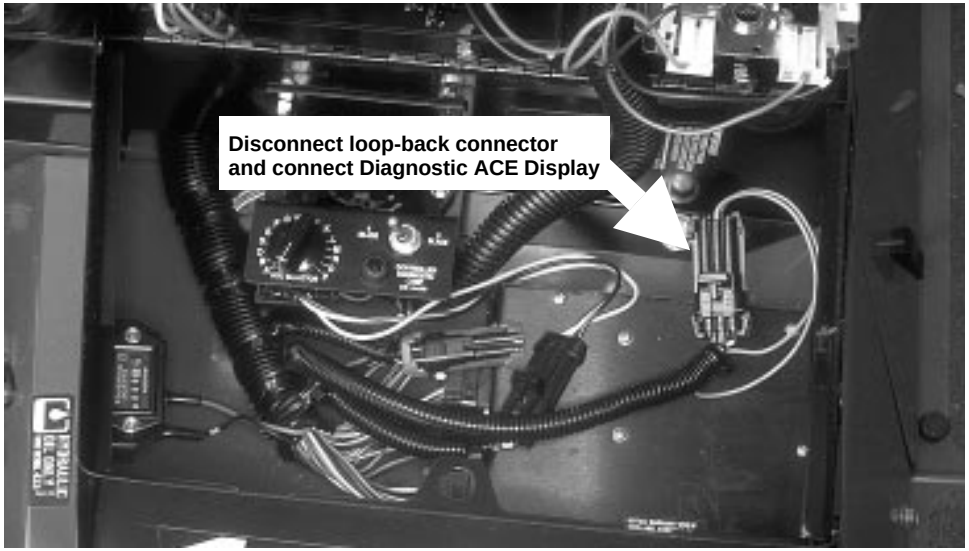
NOTE: Part number under CONTROLLER DIAGNOSTIC LAMP is the decal part number; not the lamp. The lamp part number is 85-4491

Controller Diagnostic Lamp

1. Park machine on a level surface, engage parking brake, lower cutting units and turn ignition key switch OFF.

2. Carefully disconnect loop-back connector from wire harness.

3. Connect Diagnostic ACE to connector on wiring harness (where loop-back connector was removed).



Installing Diagnostic ACE™

1. After connecting Diagnostic ACE and turning key switch ON, move any input switch, such as the Enable/Disable switch, to get the Diagnostic ACE display to function. DO NOT start the engine.

CAUTION: To prevent possible personal injury, lower cutting units before working on machine. If ignition key switch is on, cutting units will lower when joystick is moved to lower/mow position.

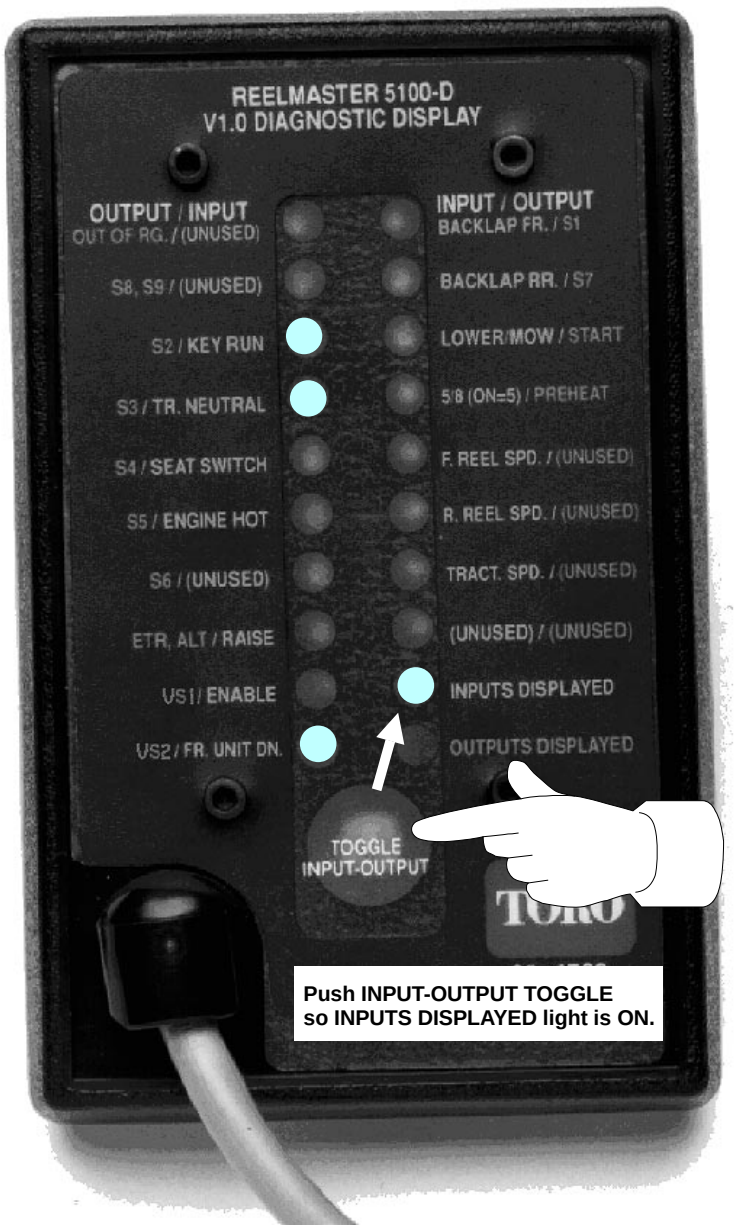
NOTE: After doing step 1, the "INPUTS DISPLAYED" LED will be on. This indicates that the ECU and Diagnostic ACE are operating properly. If the green Controller Diagnostic Lamp on the machine comes on, but the "INPUTS DISPLAYED" LED does not come on, there is a problem with the Diagnostic ACE.

2. If necessary, push input-output toggle button so "INPUTS DISPLAYED" LED is on. Do not hold the button down.

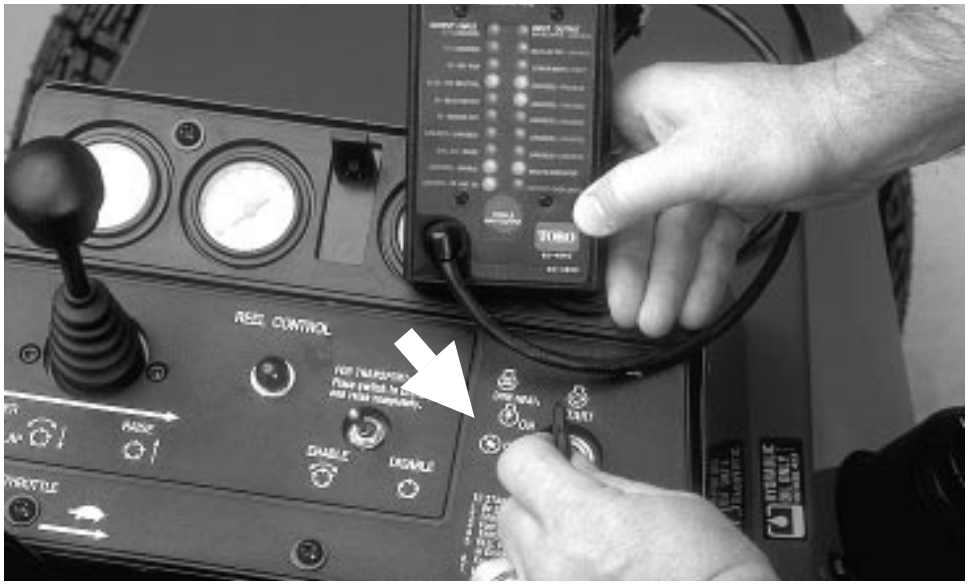
NOTE: Red text on overlay decal refers to input switches and green text to outputs.

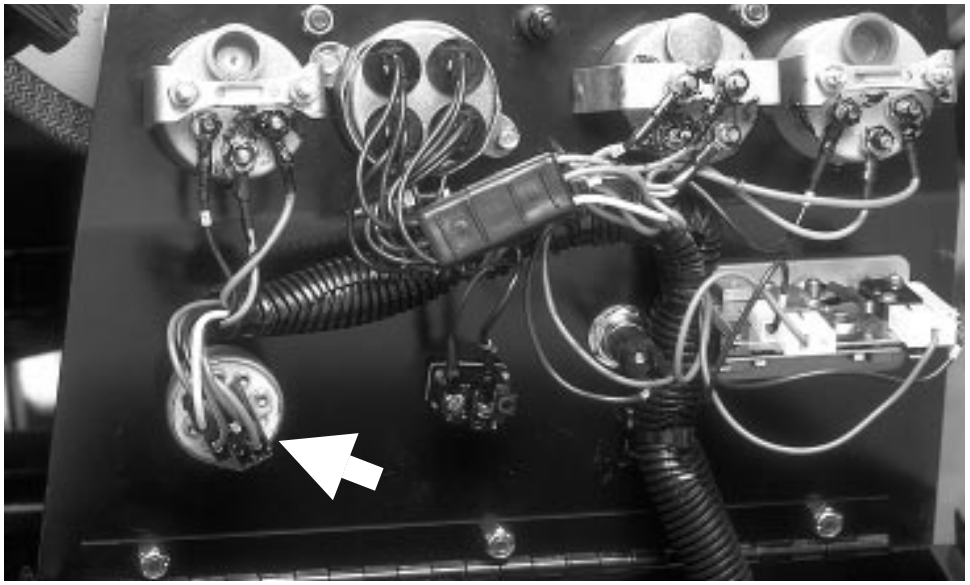
3. The Diagnostic ACE will illuminate the LED associated with each input when that input switch is closed. Check each switch (input) by opening and closing the switch, then verifying that the corresponding LED goes on and off as the switch position is changed. For example, with traction pedal in neutral, "TR. NEUTRAL" LED should be on, then go off, when traction pedal is moved out of neutral. Check function for each switch that can be changed manually.

4. If a switch is closed and corresponding LED does not go on, check all wiring and connections to switch and/or test switch with a continuity tester or ohm-meter. Replace any faulty switches and repair or replace any faulty wiring or connectors.

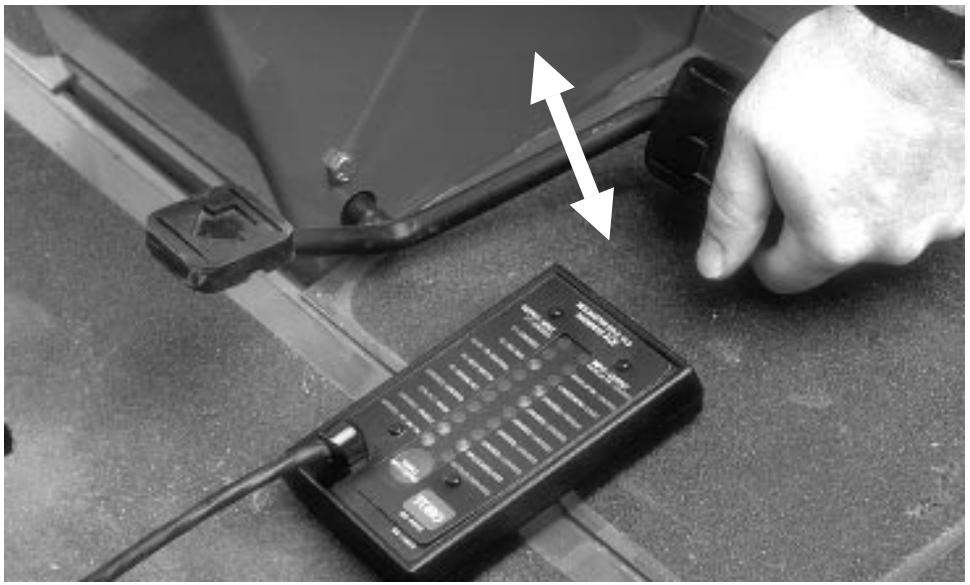


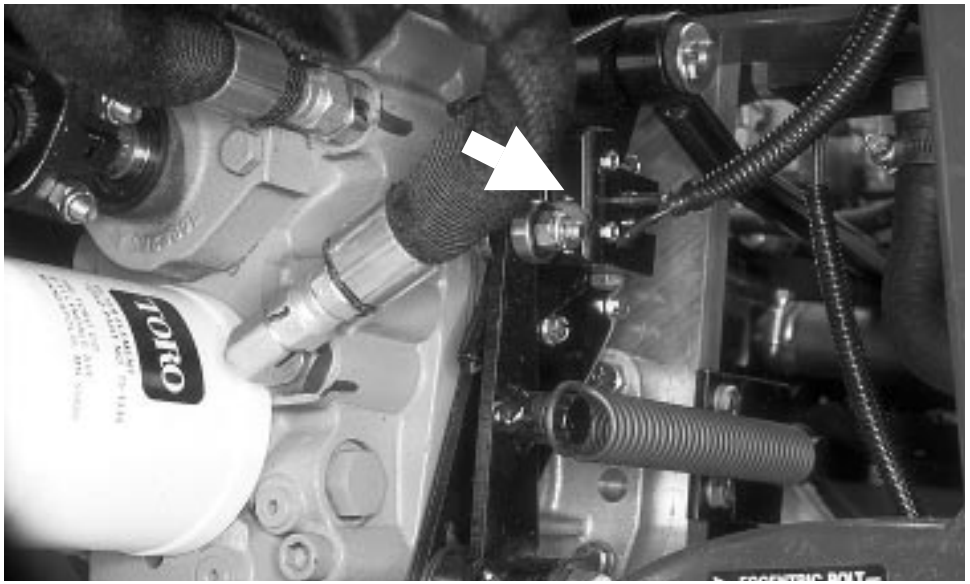
Checking INPUTS



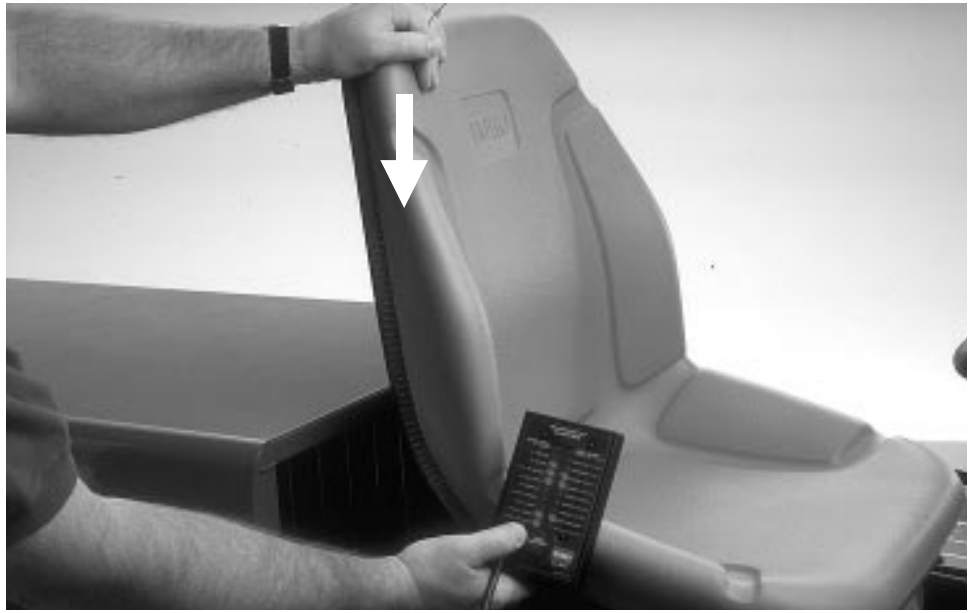


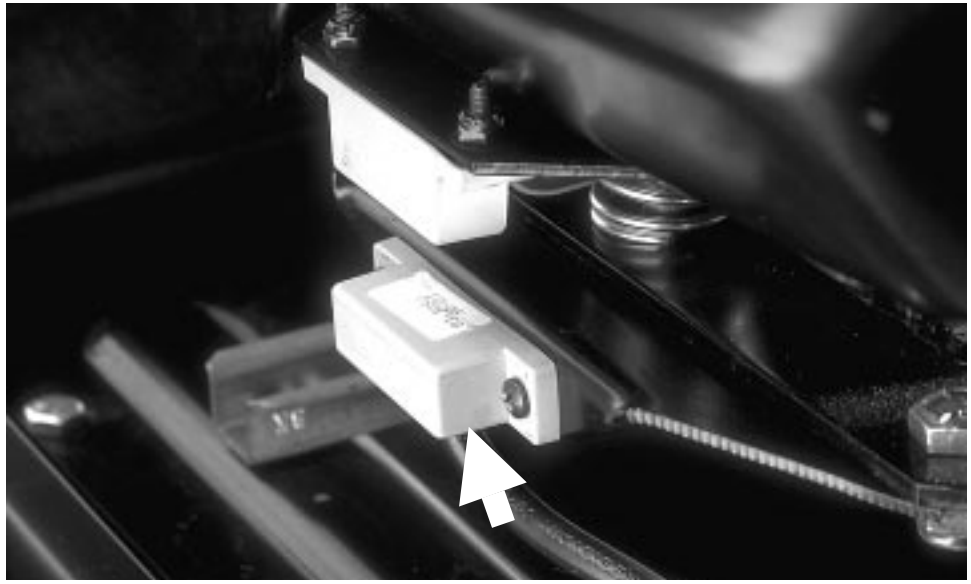
INPUT – KEY RUN



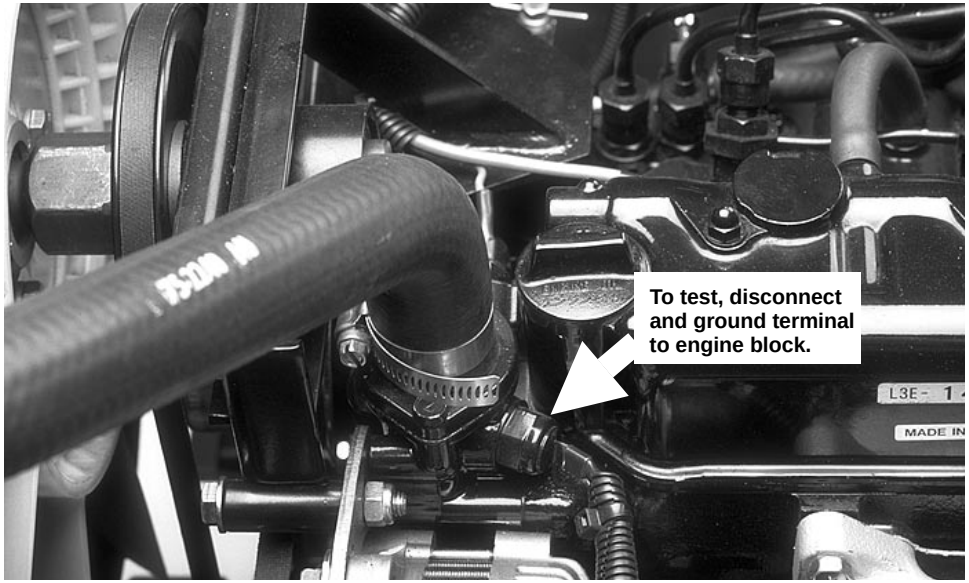


INPUT – TR. NEUTRAL





INPUT – SEAT SWITCH

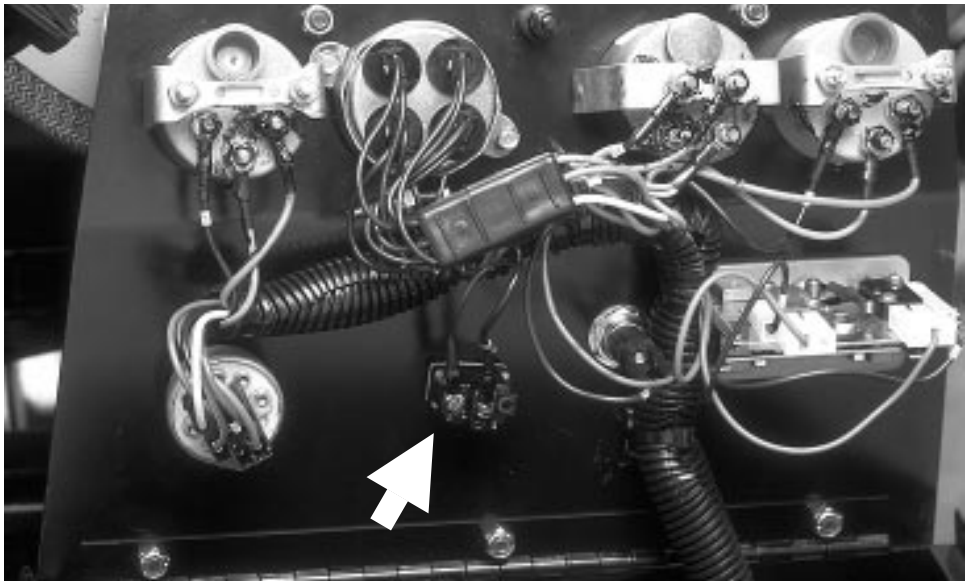


INPUT – ENGINE HOT

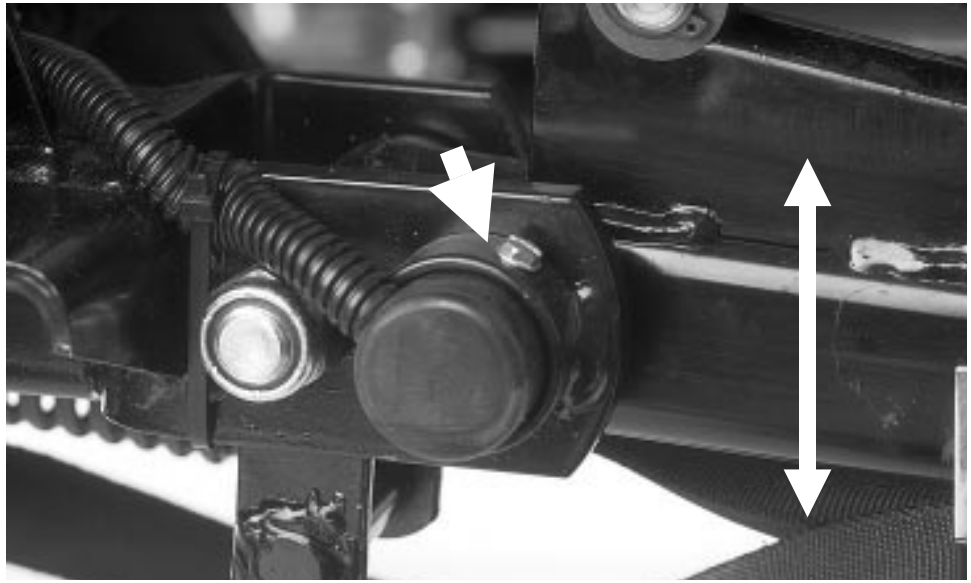

REELMASTER 5100-D
V1.0 DIAGNOSTIC DISPLAY
OUTPUT / INPUT
OUT OF RG. / (UNUSED)
S8, S9 / (UNUSED)
S2 / KEY RUN
S3 / TR. NEUTRAL
S4 / SEAT SWITCH
S5 / ENGINE HOT
S6 / (UNUSED)
ETR, ALT / RAISE
VS1 / ENABLE
VS2 / FR. UNIT DN.
INPUT / OUTPUT
BACKLAP FR. / S1
BACKLAP RR. / S7
LOWER/MOW / START
5/8 (ON=5) / PREHEAT
F. REEL SPD. / (UNUSED)
R. REEL SPD. / (UNUSED)
TRACT. SPD. / (UNUSED)
(UNUSED) / (UNUSED)
INPUTS DISPLAYED
OUTPUTS DISPLAYED
TOGGLE
INPUT-OUTPUT
TORO
85-4760
85-4850


TORO
LOWER
MOW
BACKLAP
RAISE

INPUT – RAISE

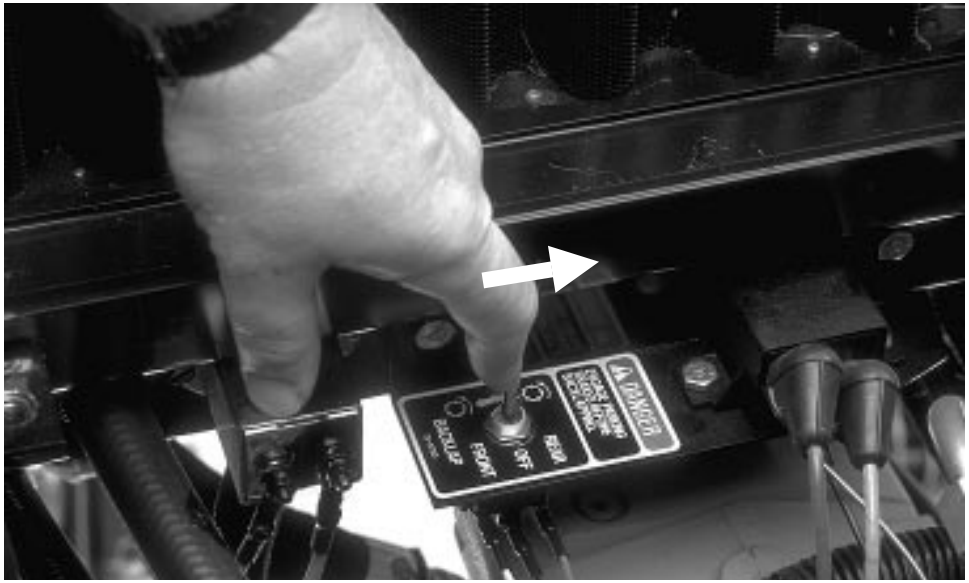


INPUT – ENABLE

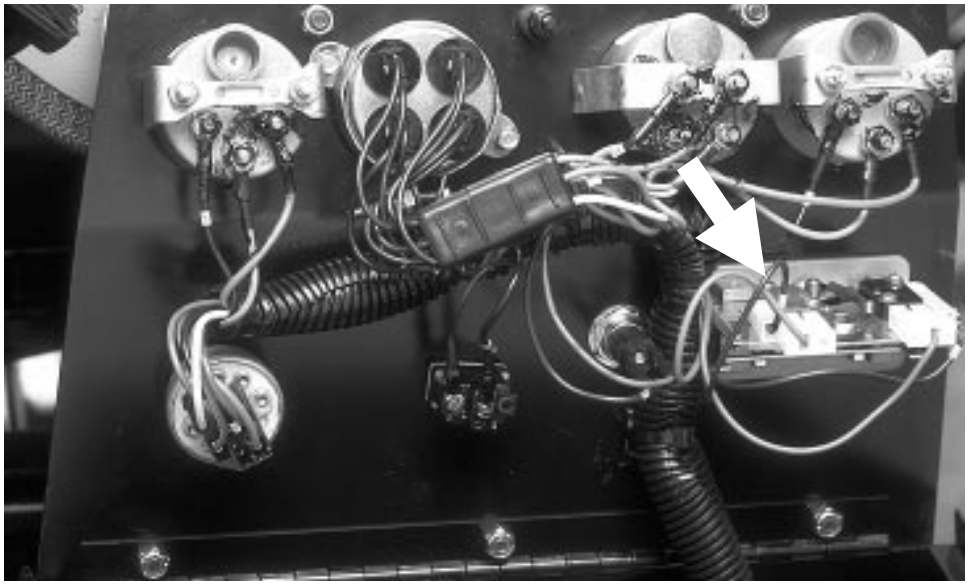


INPUT – FR. UNIT DN.

INPUT – BACKLAP FR.

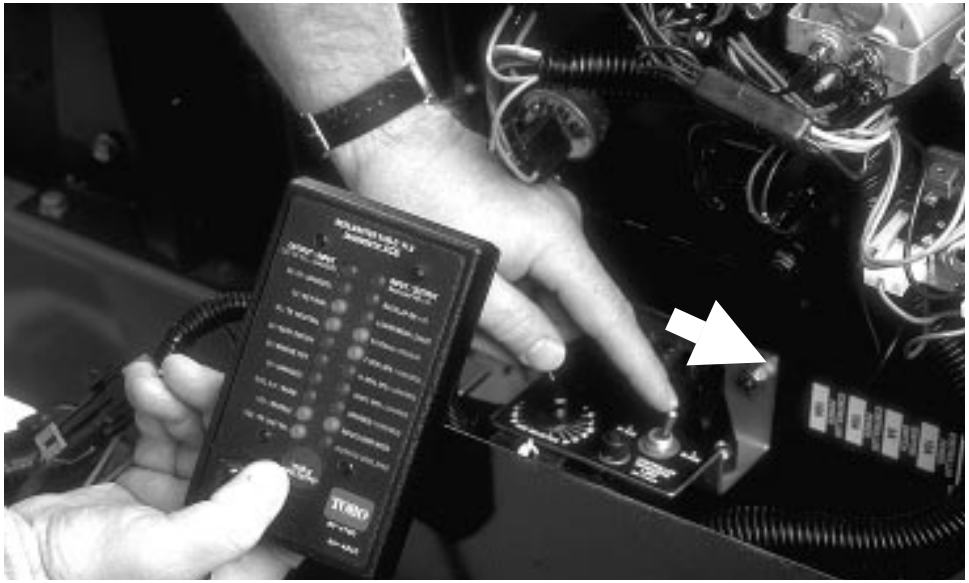


INPUT – BACKLAP RR.

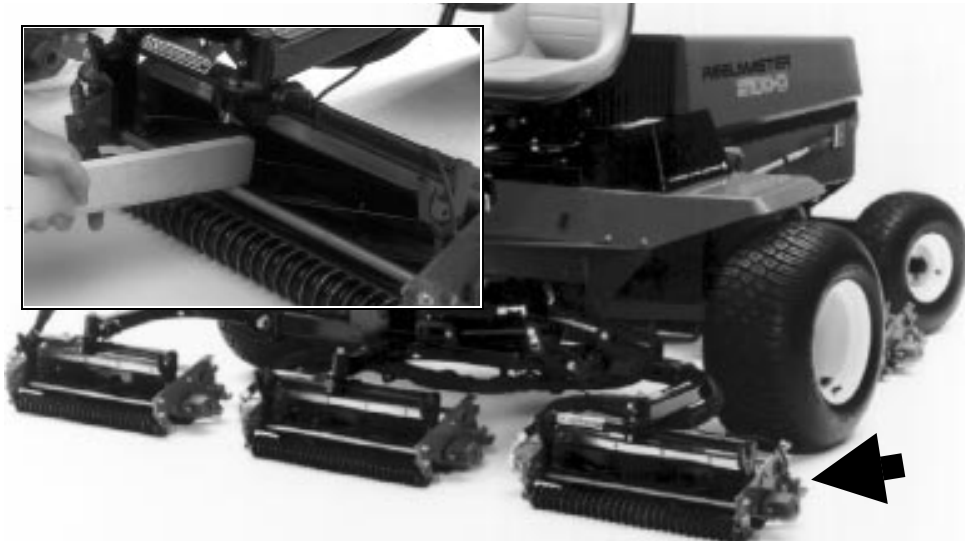


INPUT – LOWER/MOW

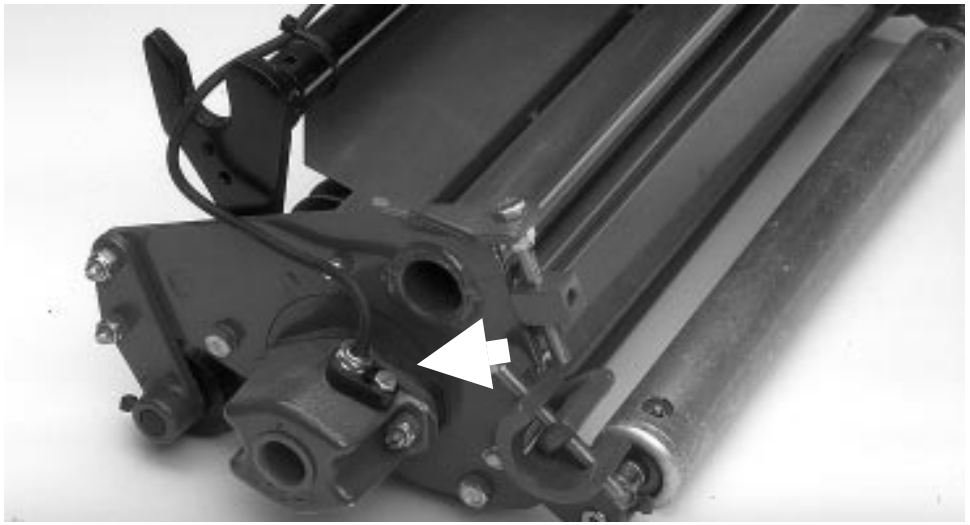

REELMASTER 5100-D
V1.0 DIAGNOSTIC DISPLAY
OUTPUT / INPUT
OUT OF RG. / (UNUSED)
S8, S9 / (UNUSED)
S2 / KEY RUN
S3 / TR. NEUTRAL
S4 / SEAT SWITCH
S5 / ENGINE HOT
S6 / (UNUSED)
ETR, ALT / RAISE
VS1 / ENABLE
VS2 / FR. UNIT DN.
INPUT / OUTPUT
BACKLAP FR. / S1
BACKLAP RR. / S7
LOWER/MOW / START
5/8 (ON=5) / PREHEAT
F. REEL SPD. / (UNUSED)
R. REEL SPD. / (UNUSED)
TRACT. SPD. / (UNUSED)
(UNUSED) / (UNUSED)
INPUTS DISPLAYED
OUTPUTS DISPLAYED
TOGGLE
INPUT-OUTPUT
TORO
85-4760
85-4850



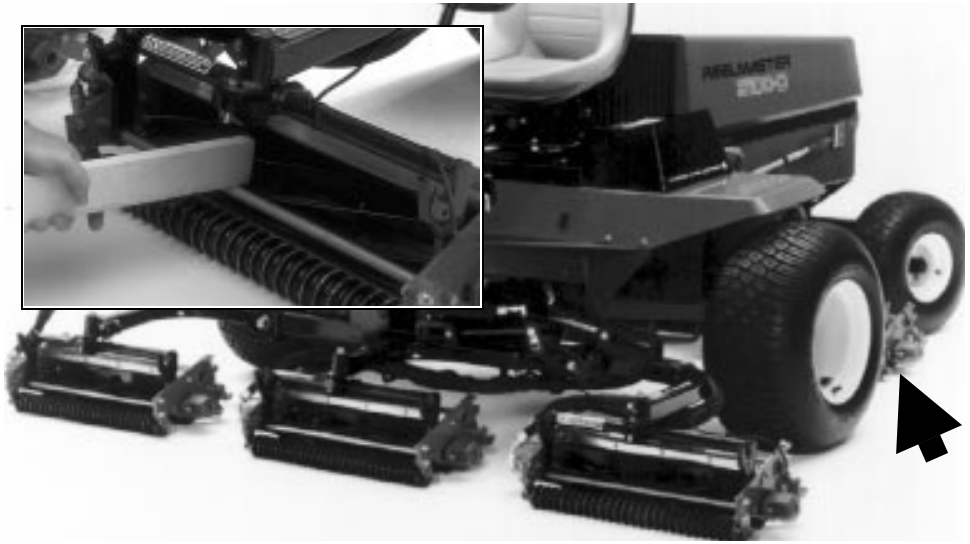
INPUT – 5/8 (ON = 5)



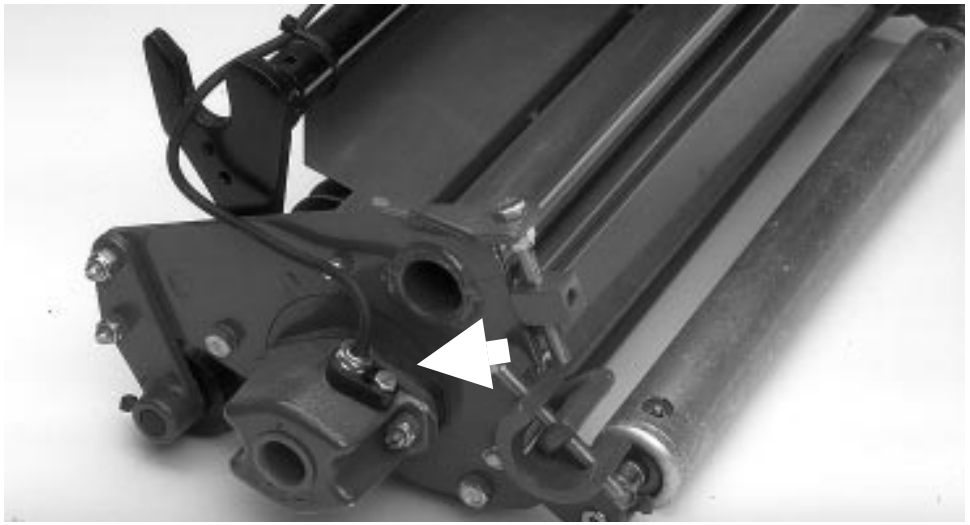
Use a piece of wood to manually turn the reel.



INPUT – F. REEL SPD.

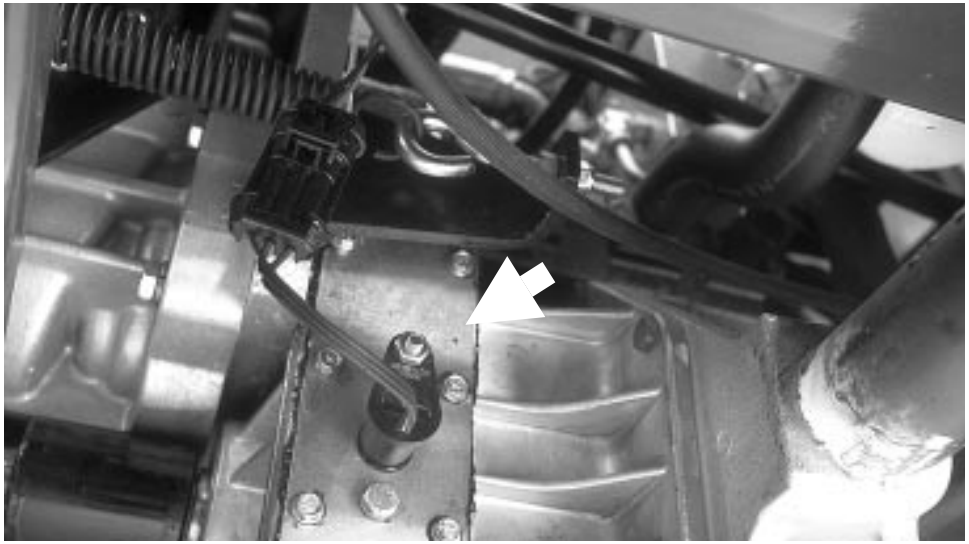


Use a piece of wood to manually turn the reel.



INPUT – R. REEL SPD.

Release parking brake and move machine a small distance (1 to 2 inches).



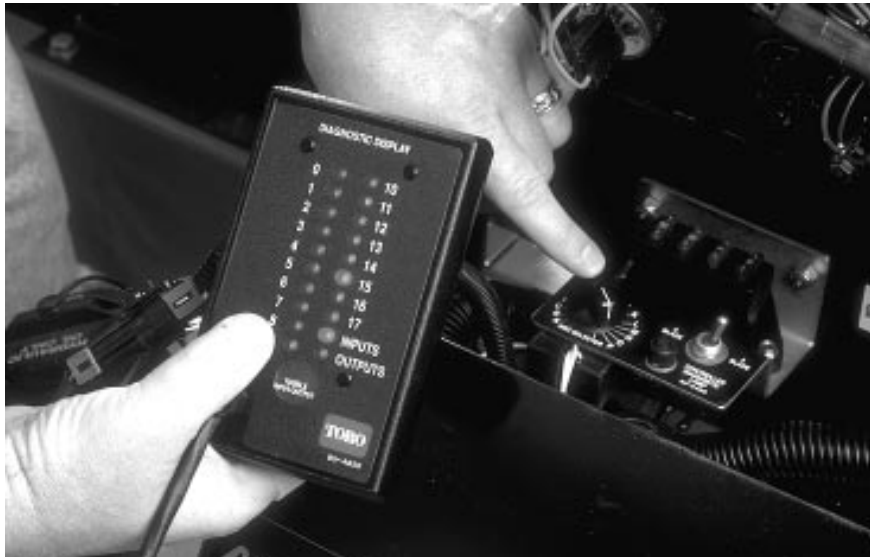
INPUT – TRAC. SPD

1. Remove overlay decal from front of Diagnostic ACE so numbers “0” to “17” next to LED’s are visible.

2. Set ECU to special diagnostic mode:
   A. Turn ignition key switch OFF.
   B. Raise seat and set Backlap switch to FRONT backlap position.
   C. Set Enable/Disable switch to DISABLE position.
   D. Hold Lower/Mow-Raise lever in RAISE position and turn ignition key switch to ON position. Release Lower/Mow-Raise lever.

3. Slowly turn HOC Selector. LED’s on Diagnostic ACE will show how ECU is enterpreting HOC Selector. LED labeled “0“ should be illuminated when knob is pointed to “A”, and LED labeled “15” should be illuminated when knob is pointed to “P”. Table below shows when machine is set for correct clip. It is not necessary for knob to line up with letters on decal for machine to function normally.

Diagnostic ACE Display LED	HOC Selector Position	8 Blade Height-of-cut		5 Blade Height-of-cut	
		Inches	mm	Inches	mm
0	A	Full Speed		Full Speed	
1	B	0.25	6.4	0.50	12.7
2	C	0.30	7.6	0.55	14.0
3	D	0.35	8.9	0.60	15.2
4	E	0.40	10.2	0.65	16.5
5	F	0.45	11.4	0.70	17.8
6	G	0.50	12.7	0.75	19.1
7	H	0.55	14.0	0.80	20.3
8	I	0.60	15.2	0.85	21.6
9	J	0.65	16.5	0.90	22.8
10	K	0.70	17.8	0.95	24.0
11	L	0.75	19.0	1.00	25.4
12	M	0.80	20.3	1.10	27.0
13	N	0.85	21.6	1.20	30.0
14	O	0.90	22.9	1.30	33.0
15	P	0.95	24.1	1.40	36.0



4. Turn Ignition key switch OFF and install overlay decal on Diagnostic ACE.

INPUT – HOC Selector

1. After installing Diagnostic ACE, turn ignition key switch ON, but DO NOT start the engine.

NOTE: After installing Diagnostic ACE and turning ignition key switch ON, the "INPUTS DISPLAYED" LED will be on. This indicates that the ECU and Diagnostic ACE are operating properly. If the green controller diagnostic lamp on the machine comes on, but the "INPUTS DISPLAYED" LED does not come on, there is a problem with the Diagnostic ACE.

2. Push input-output toggle button so "OUTPUTS DISPLAYED" LED is on.

NOTE: It may be necessary to toggle between "INPUTS DISPLAYED" and "OUTPUTS DISPLAYED" several times to do this procedure. To toggle back and forth, press toggle button once. This may be done as often as necessary. DO NOT hold button.

NOTE: Red text on overlay decal refers to input switches and green text to outputs.

3. Sit on the seat and attempt to operate desired function of machine – DO NOT start the engine. The appropriate output LED's should illuminate to indicate that the ECU is turning on that function.

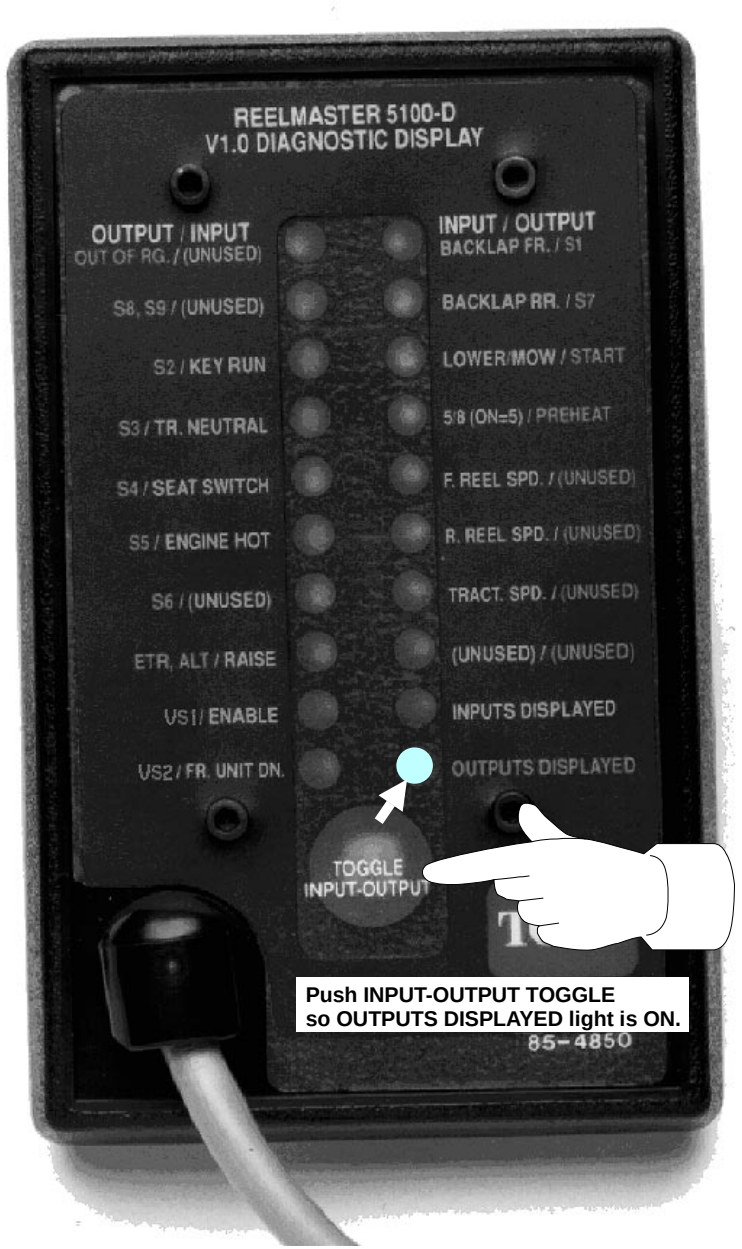
If any output LED is *FLASHING ON* and *OFF*, this indicates an electrical problem with that OUTPUT. To reset a flashing LED, turn the key switch OFF, then back ON.

If no output LED's are flashing on and off, but the correct output LED's do not illuminate, verify that the required input switches are in the necessary positions to allow that function to occur.

If input switches are correct, but output LED's are not correct, this indicates a controller malfunction.

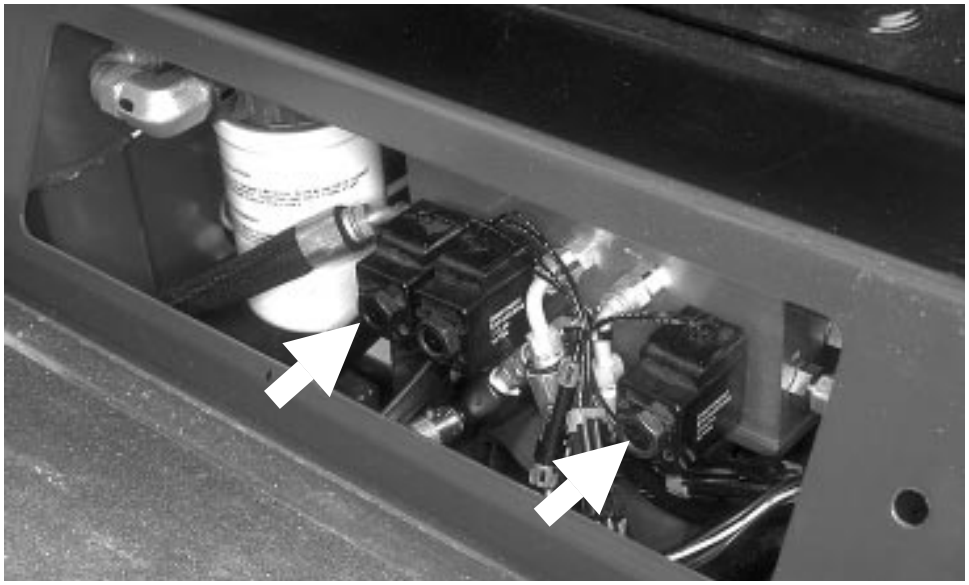
If output LED's are correct, but machine does not function properly, this indicates a hydraulic problem.

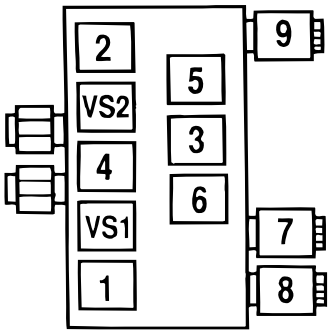
NOTE: Due to electrical system constraints, the output LED's for "START", "PREHEAT" and "ETR/ALT" may not flash on and off, even though an electrical problem may exist for one of those functions. If the machine problem appears to be with one of these functions, see the troubleshooting charts in the Reelmaster 5100-D Service Manual.



Checking OUTPUTS

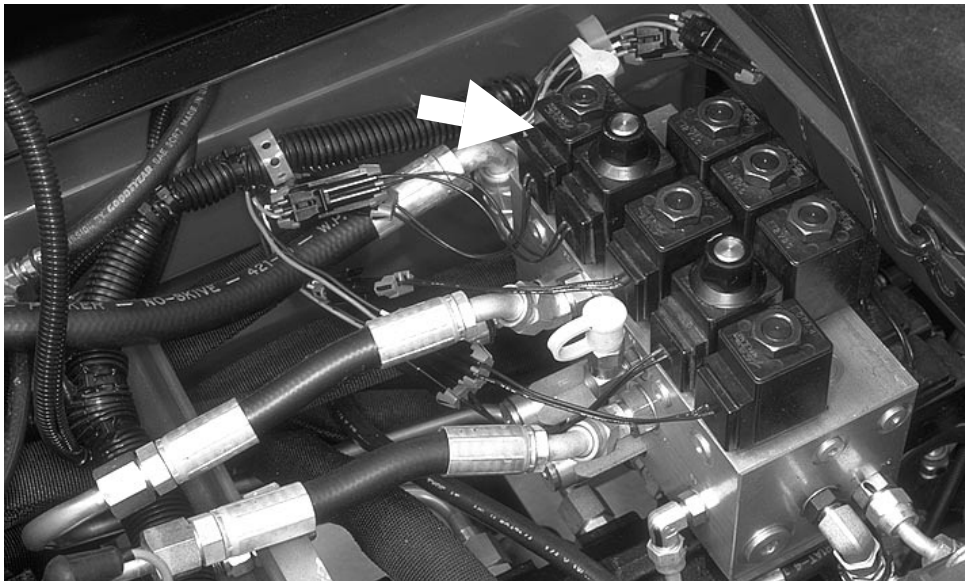
OUTPUT – OUT OF RG.

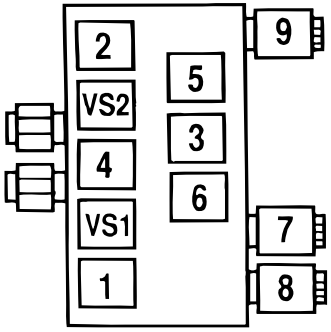




Solenoid	Power Wire Color	Function
VS1	Orange/Black	Front reel speed
VS2	Orange/White	Rear reel speed
S1	Pink/Blue	Front reels On/Off
S2	Brown/White	Rear reels On/Off
S3	Orange/Blue	Lift / Lower front wing cutting units
S4	Yellow/Black	Lift / Lower center cutting unit
S5	Yellow/White	Lift / Lower rear cutting units
S6	Orange/Red	Lower any cutting unit
S7	Yellow/Blue	Lift any cutting unit
S8	Black/Red	Backlap
S9	Brown/White	Backlap

OUTPUT – S8, S9





Solenoid	Power Wire Color	Function
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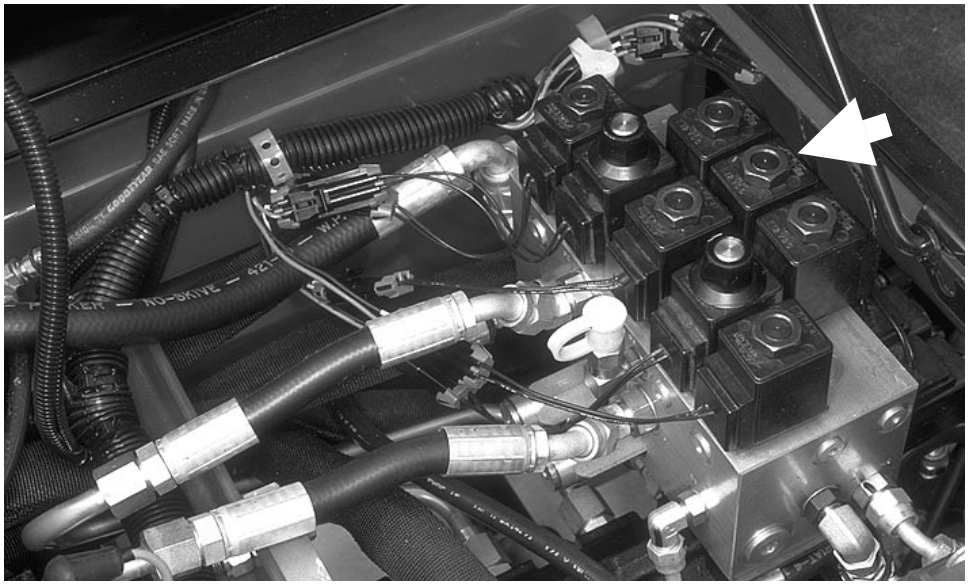
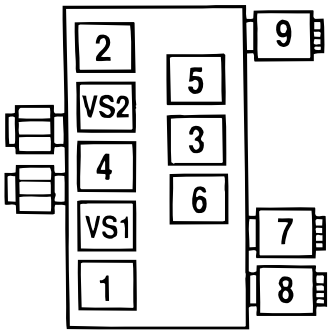
S4	Yellow/Black	Lift / Lower center cutting unit
S5	Yellow/White	Lift / Lower rear cutting units
S6	Orange/Red	Lower any cutting unit
S7	Yellow/Blue	Lift any cutting unit
S8	Black/Red	Backlap
S9	Brown/White	Backlap

OUTPUT – S2





Solenoid	Power Wire Color	Function
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VS2	Orange/White	Rear reel speed
S1	Pink/Blue	Front reels On/Off
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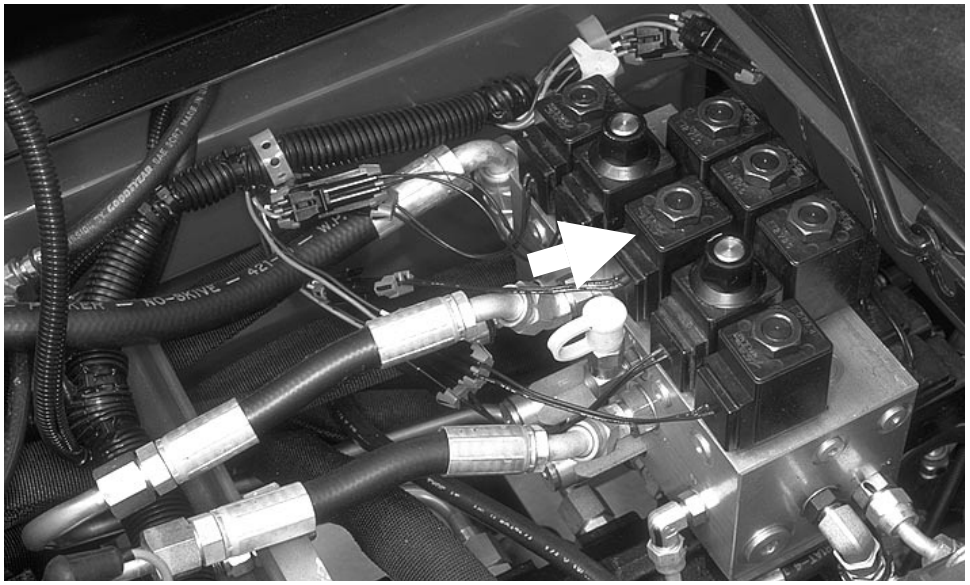
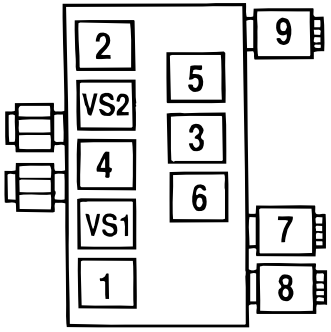
S3	Orange/Blue	Lift / Lower front wing cutting units
S4	Yellow/Black	Lift / Lower center cutting unit
S5	Yellow/White	Lift / Lower rear cutting units
S6	Orange/Red	Lower any cutting unit
S7	Yellow/Blue	Lift any cutting unit
S8	Black/Red	Backlap
S9	Brown/White	Backlap

OUTPUT – S3





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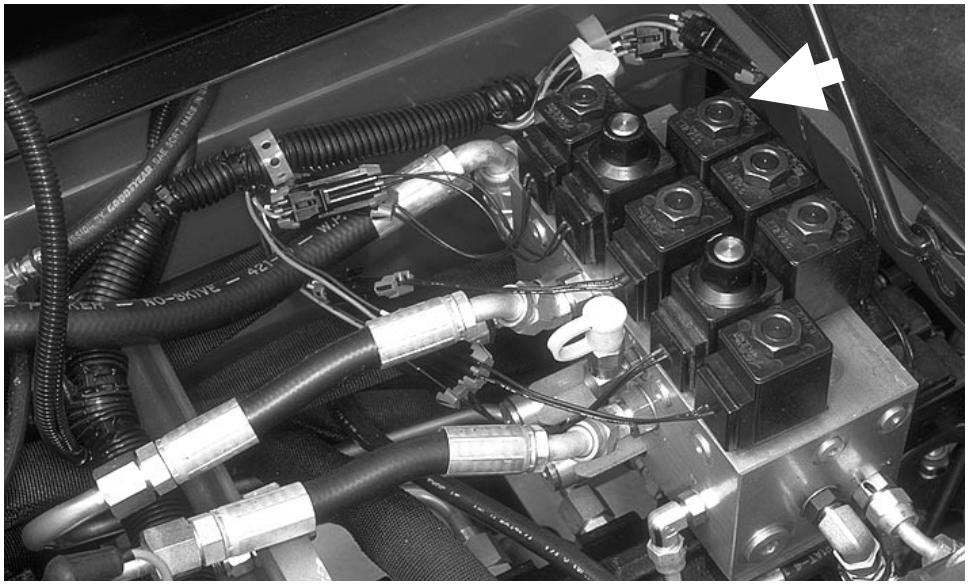
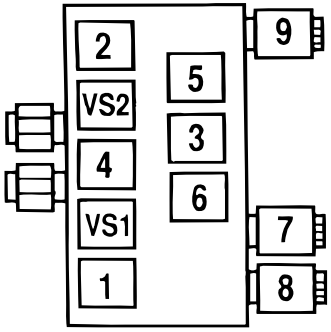
S4	Yellow/Black	Lift / Lower center cutting unit
S5	Yellow/White	Lift / Lower rear cutting units
S6	Orange/Red	Lower any cutting unit
S7	Yellow/Blue	Lift any cutting unit
S8	Black/Red	Backlap
S9	Brown/White	Backlap

OUTPUT – S4





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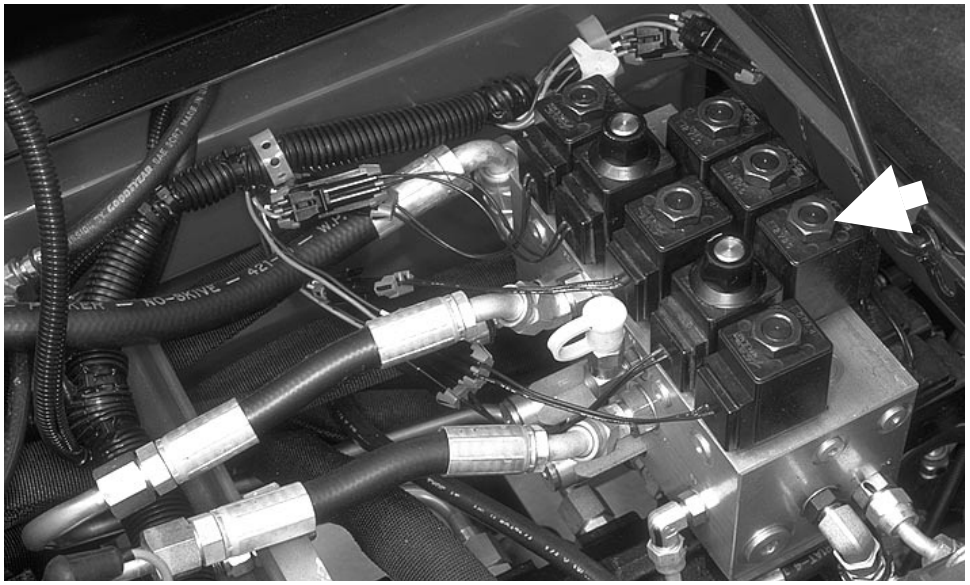
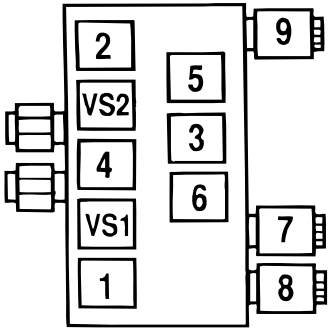
S5	Yellow/White	Lift / Lower rear cutting units
S6	Orange/Red	Lower any cutting unit
S7	Yellow/Blue	Lift any cutting unit
S8	Black/Red	Backlap
S9	Brown/White	Backlap

OUTPUT – S5





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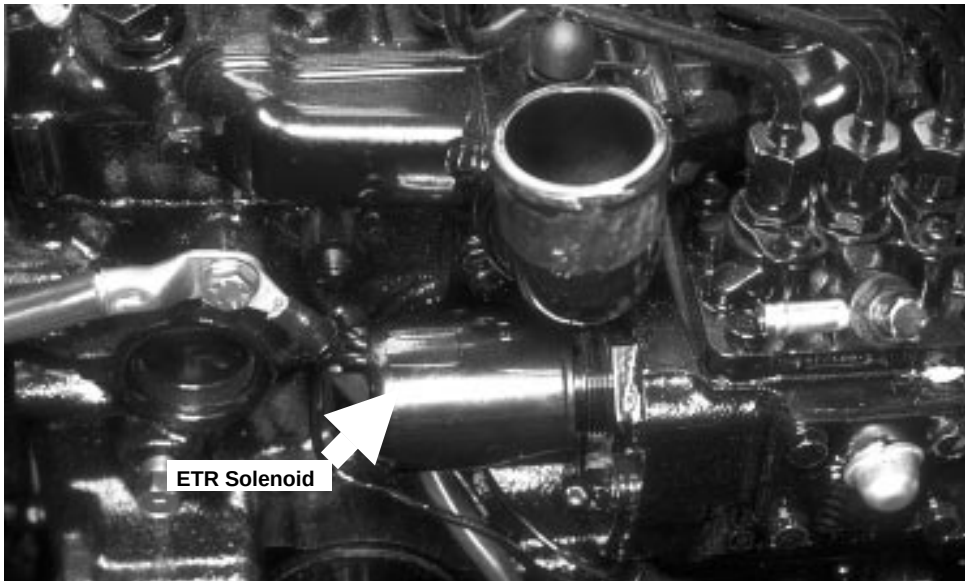
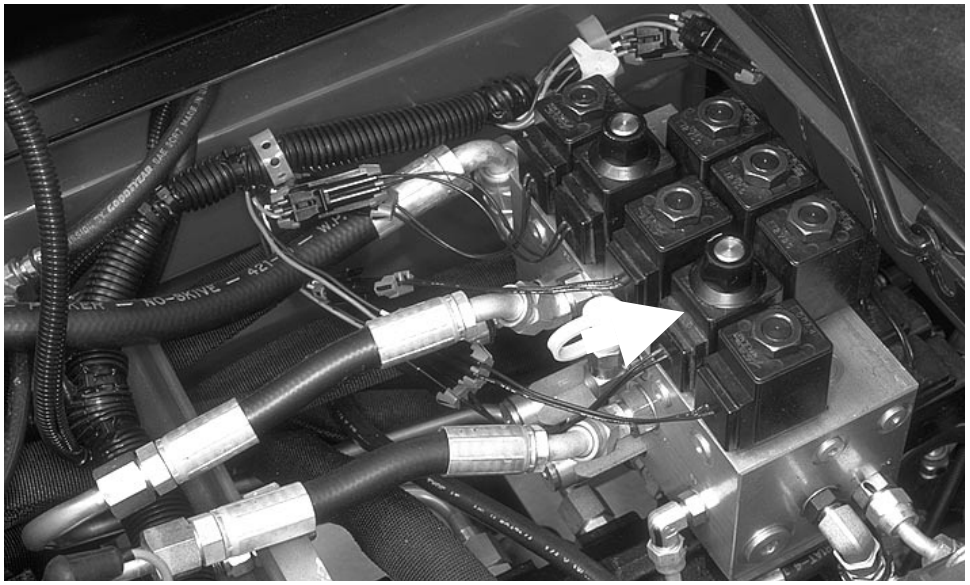
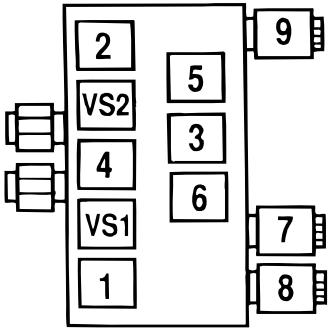
S5	Yellow/White	Lift / Lower rear cutting units
S6	Orange/Red	Lower any cutting unit
S7	Yellow/Blue	Lift any cutting unit
S8	Black/Red	Backlap
S9	Brown/White	Backlap

OUTPUT – S6



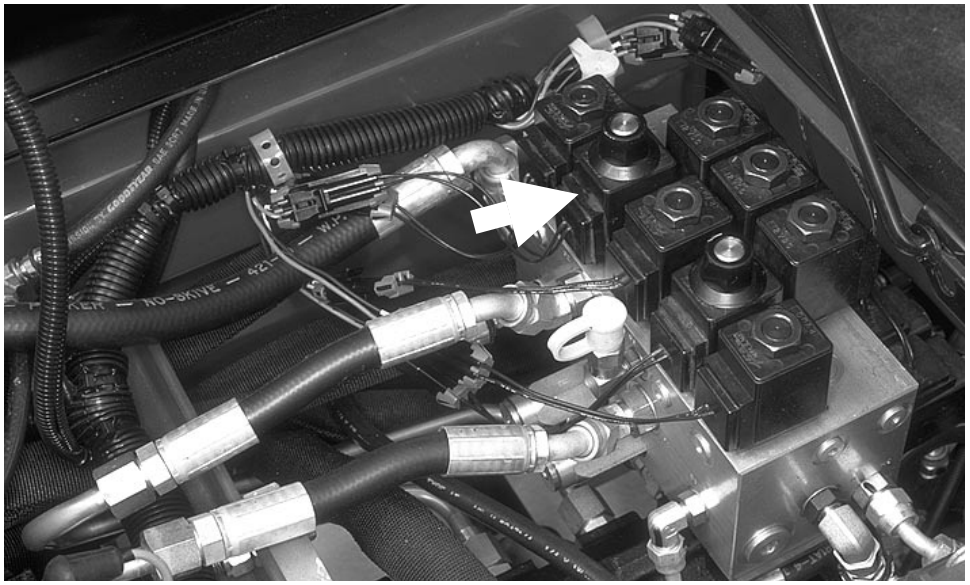
OUTPUT – ETR, ALT

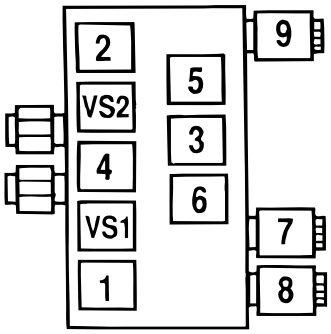




Solenoid	Power Wire Color	Function
VS1	Orange/Black	Front reel speed
VS2	Orange/White	Rear reel speed
S1	Pink/Blue	Front reels On/Off
S2	Brown/White	Rear reels On/Off
S3	Orange/Blue	Lift / Lower front wing cutting units
S4	Yellow/Black	Lift / Lower center cutting unit
S5	Yellow/White	Lift / Lower rear cutting units
S6	Orange/Red	Lower any cutting unit
S7	Yellow/Blue	Lift any cutting unit
S8	Black/Red	Backlap
S9	Brown/White	Backlap

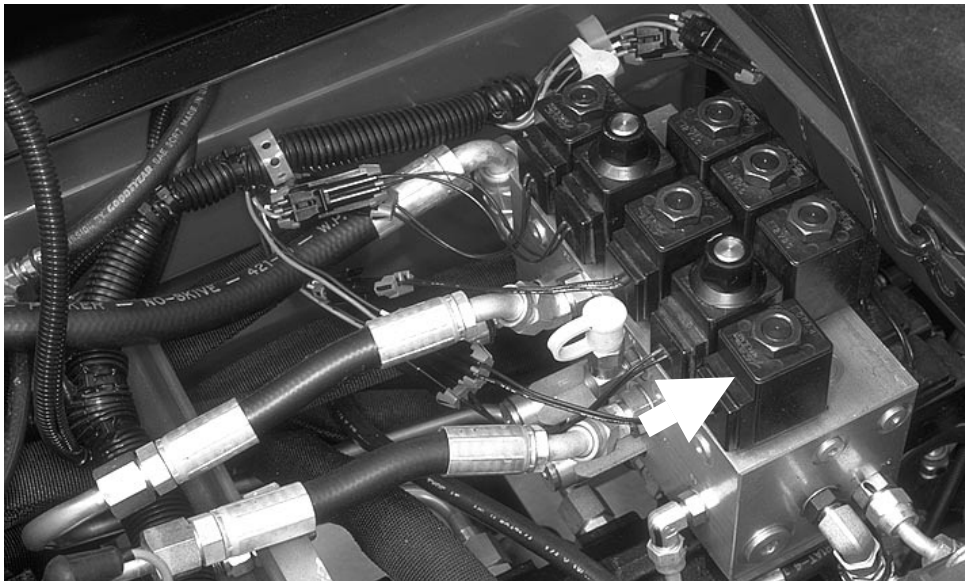
OUTPUT – VS1

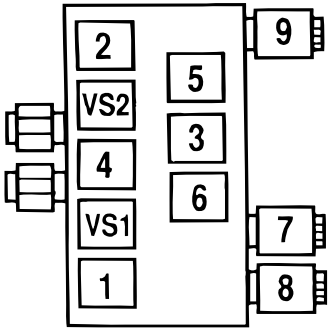




Solenoid	Power Wire Color	Function
VS1	Orange/Black	Front reel speed
VS2	Orange/White	Rear reel speed
S1	Pink/Blue	Front reels On/Off
S2	Brown/White	Rear reels On/Off
S3	Orange/Blue	Lift / Lower front wing cutting units
S4	Yellow/Black	Lift / Lower center cutting unit
S5	Yellow/White	Lift / Lower rear cutting units
S6	Orange/Red	Lower any cutting unit
S7	Yellow/Blue	Lift any cutting unit
S8	Black/Red	Backlap
S9	Brown/White	Backlap

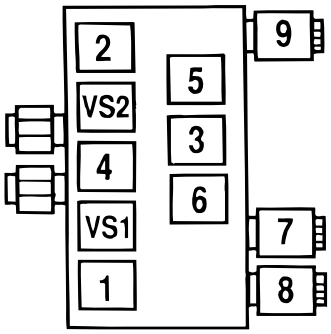
OUTPUT – VS2





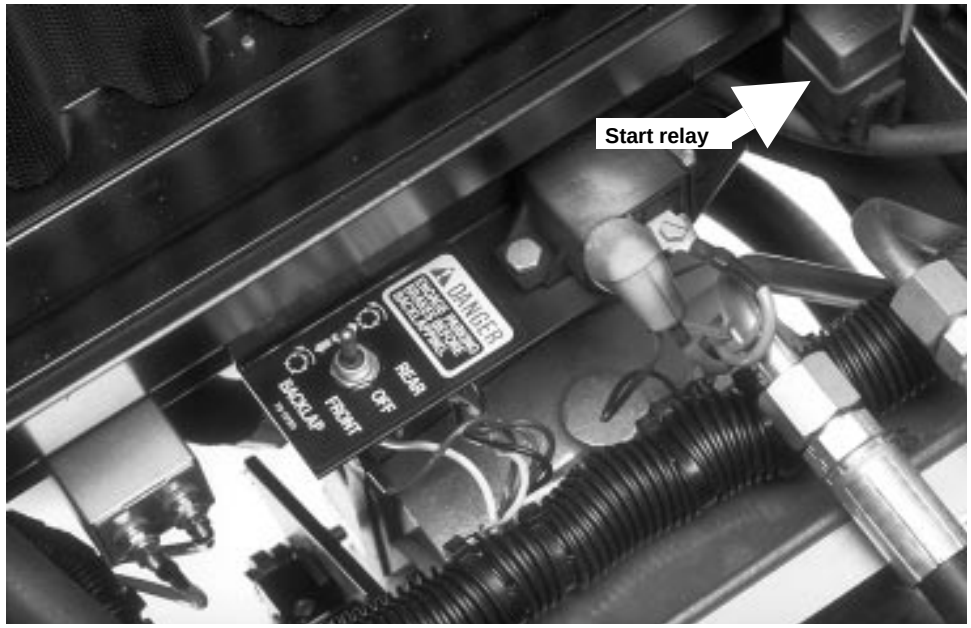
Solenoid	Power Wire Color	Function
VS1	Orange/Black	Front reel speed
VS2	Orange/White	Rear reel speed
S1	Pink/Blue	Front reels On/Off
S2	Brown/White	Rear reels On/Off
S3	Orange/Blue	Lift / Lower front wing cutting units
S4	Yellow/Black	Lift / Lower center cutting unit
S5	Yellow/White	Lift / Lower rear cutting units
S6	Orange/Red	Lower any cutting unit
S7	Yellow/Blue	Lift any cutting unit
S8	Black/Red	Backlap
S9	Brown/White	Backlap

OUTPUT – S1

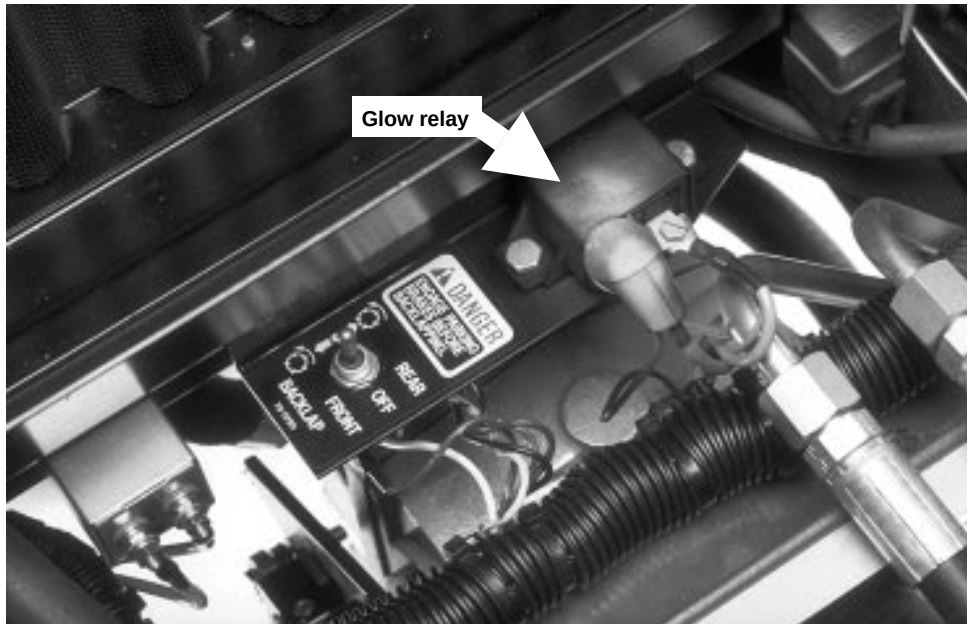


Solenoid	Power Wire Color	Function
VS1	Orange/Black	Front reel speed
VS2	Orange/White	Rear reel speed
S1	Pink/Blue	Front reels On/Off
S2	Brown/White	Rear reels On/Off
S3	Orange/Blue	Lift / Lower front wing cutting units
S4	Yellow/Black	Lift / Lower center cutting unit
S5	Yellow/White	Lift / Lower rear cutting units
S6	Orange/Red	Lower any cutting unit
S7	Yellow/Blue	Lift any cutting unit
S8	Black/Red	Backlap
S9	Brown/White	Backlap

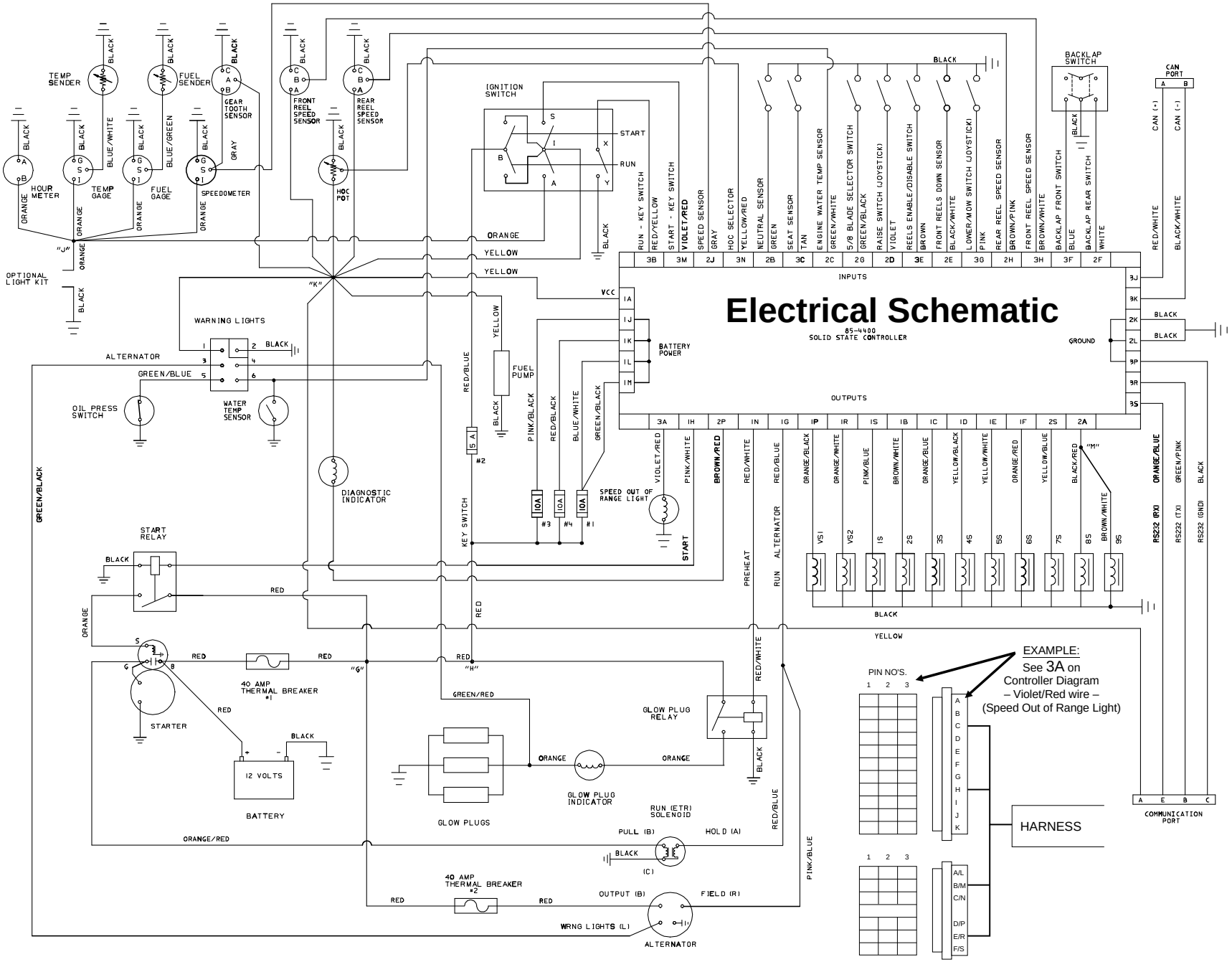
OUTPUT – S7

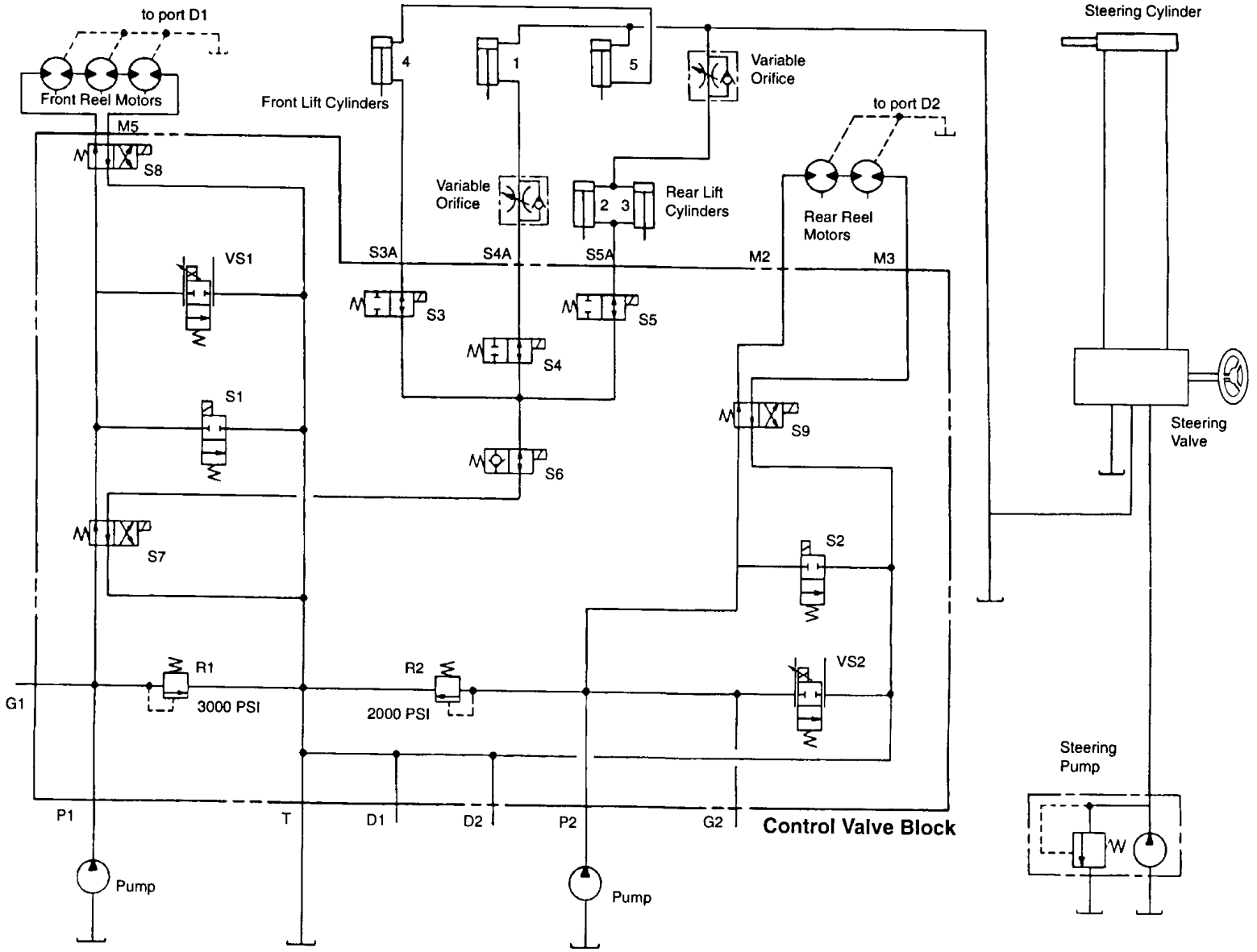


OUTPUT – START



OUTPUT – PREHEAT


Electrical Schematic
85-4400
SOLID STATE CONTROLLER
INPUTS
OUTPUTS
IGNITION SWITCH
START
RUN
TEMP SENDER
FUEL SENDER
GEAR TOOTH SENSOR
FRONT REEL SPEED SENSOR
REAR REEL SPEED SENSOR
HOUR METER
TEMP GAGE
FUEL GAGE
SPEEDOMETER
HOC POT
BACKLAP SWITCH
CAN PORT
CAN (+)
CAN (-)
OPTIONAL LIGHT KIT
WARNING LIGHTS
ALTERNATOR
OIL PRESS SWITCH
WATER TEMP SENSOR
FUEL PUMP
BATTERY POWER
GROUND
DIAGNOSTIC INDICATOR
SPEED OUT OF RANGE LIGHT
KEY SWITCH
START RELAY
STARTER
12 VOLTS
BATTERY
40 AMP THERMAL BREAKER #1
40 AMP THERMAL BREAKER #2
GLOW PLUGS
GLOW PLUG RELAY
GLOW PLUG INDICATOR
RUN (ETR) SOLENOID
PULL (B)
HOLD (A)
OUTPUT (B)
FIELD (F)
WRNG LIGHTS (L)
ALTERNATOR
PIN NO'S.
EXAMPLE:
See 3A on Controller Diagram – Violet/Red wire – (Speed Out of Range Light)
HARNESS
COMMUNICATION PORT
RS232 (RX)
RS232 (TX)
RS232 (GND)



Hydraulic Schematic

NOTE: Schematic shown is in Lower/Mow mode.
Mow: S1, VS1, S2, VS2 energized.
Lower: S6, S3, S4, S5 energized.

Other modes:
Backlap Front: S1, VS1, S8, S9 energized.
Backlap Rear: S2, VS2, S8, S9 energized.
Lift all cutting units: S7, S3, S4, S5 energized.

Commercial Products

Form 92-800-SL, Rev. B

Printed in U.S.A.